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| EXAMINER |
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WITHERSPOON, SIKARL A

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1621

| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE  | DELIVERY MODE |
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.



### **DETAILED ACTION**

The examiner has considered the response filed by applicants on October 25, 2006 and the arguments therein. Applicants' arguments were not found persuasive and as such, the following rejection(s) have been maintained.

#### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-5, 7-11, and 15-18, 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yates (US 4,443,638) and further in view of Miyazawa et al (EP 0272608).

The instant claims are drawn to a process for preparing aldehydes and alcohols by subjecting olefins to a rhodium-catalyzed hydroformylation with subsequent separation by distillation of the hydroformylation output into products and a rhodium-containing solution, and recirculation of the rhodium-containing solution, wherein the rhodium concentration of said solution is 20 to 150 ppm by mass.

Yates teaches a process for preparing alcohols (and aldehydes) by the hydroformylation of internal olefins in the presence of a ligand-modified recycled rhodium catalyst where the rhodium concentration is no greater than 20 ppm based on the total feed. The reaction product is separated from the rhodium catalyst by flash

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vacuum distillation, followed by hydrogenation to produce alcohols and recycling of the product-catalyst to the hydroformylation (col. 2, line 45 to col. 3, line 8). The ligands of the rhodium catalyst include trialkylphosphites, tricycloalkylphosphites, and triarylphosphites (col. 3, lines 20-49).

The differences between Yates and the present invention are that Yates teaches a rhodium concentration of no more than 20 ppm, while applicants recite a rhodium concentration of 20 to 150 ppm, Yates does not expressly teach as ligand, the compound recited in instant claim 8, and Yates does not teach a reaction pressure of from 150 to 270 bar.

The examiner does not find these differences to be a patentable distinction and contends that it would have been obvious to a person of ordinary skill in the art, at the time the present invention was made, to either increase or decrease the rhodium concentration of the catalyst that is recycled to the hydroformylation zone, with the motivation being to keep the amount of rhodium lost as a result of the process to a minimum, and also to keep the recycled concentration of rhodium at a level that affords proper activity for the hydroformylation reaction. Yates states that the recycled catalyst was actually more active than the fresh catalyst (col. 6, lines 8-9), which suggests to one of ordinary skill that a concentration of rhodium can be found for the recycle catalyst that affords higher catalytic activity than the original catalyst.

The examiner finds it immaterial that Yates does not expressly recite the ligand of claim 8 in his disclosure, absent a showing of some unexpected result afforded by employing the ligand recited by applicants. Yates recites several examples of phosphite

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ligands that may be employed in his process, and the list is by no means exhaustive.

The compound recited in instant claim 8 is not a novel compound, and as such, the examiner takes the position that it would have been obvious to a person of ordinary skill in the art to employ one of the phosphites listed in the reference, or any known phosphite ligand known to be useful in conjunction with rhodium catalysts for use in hydroformylation reactions.

Regarding the reaction pressure, Yates teaches pressures in the range of 750 to 2000 psig, or about 52 bar to about 137 bar, i.e., pressure that are outside the range recited in the instant claims. However, Miyazawa et al teach a process for hydroformylating olefins, including internal olefins, branched olefins, mixtures thereof, etc. The process taught therein recites a pressure of from 20 to 500 kg/cm<sup>2</sup>, or from about 19 to about 490 bar. Examples 1-4 expressly teach a reaction pressure of 170 kg/cm<sup>2</sup>, or about 167 bar, said pressure being within the range recited in the instant claims.

In light of the combined reference teachings, it would have been obvious to a person having ordinary skill in the art, at the time the present invention was made, to employ a higher reaction pressure, such as the pressure recited in the examples taught by Miyazawa et al, in hydroformylation processes, such as that which is taught by Yates. One would have been motivated to modify the pressure as such in order to provide an adequate balance of pressure, or pressure and temperature, to afford optimal conversion of olefins that may be present as mixed olefins, i.e., a mixture of linear, branched, terminal, internal olefins, etc, in a hydroformylation reactant mixture.

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Claims 6, 12-14, 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yates, further in view of Miyazawa et al as applied to claims 1-5, 7-11, and 15-18 above, and further in view of Ueda et al (US 5,865,957).

The instant claims further limit the process of the instant invention to the inclusion of a solvent selected from 2,2,4-trimethylpentane-1,3-diol (TEXANOL), dioctyl phthalate, or diisononyl phthalate. Yates does not disclose the use of such solvents; however, Ueda et al, in their hydroformylation process teach that the olefin itself may be used as solvent, or the resulting aldehyde or high-boiling substances may be used, or a compound, such as dioctyl phthalate (col. 4, lines 42-52).

It therefore would have been obvious to person of ordinary skill in the art, in view of the combined teachings, to employ a solvent such as dioctyl phthalate, in the hydroformylation process taught by Yates, since Ueda et al teach that such a compound, as it is inert to the reaction, may be employed as solvent in such hydroformylation reactions.

### ***Response to Arguments***

Applicant's arguments filed October 25, 2006 have been fully considered but they are not persuasive. The thrust of applicants' arguments is that the Yates reference teaches away from combination with the Miyazawa reference, since Yates teaches a rhodium concentration of no greater than 20 ppm, while Miyazawa teaches about 1 to 500 ppm.

The examiner does not find this argument persuasive; first, because though small, there is a range of rhodium concentration suggested by Miyazawa, i.e., from 1-20 ppm, which is within the range suggested by Yates. Second, the examiner did not cite the Miyazawa reference to teach the concentration of rhodium, although as previously stated, there is a small overlap of ranges. The examiner has already stated in the rejection above, that the motivation to modify the concentration of rhodium in the recycled catalyst is supplied by the Yates reference itself. Rather, Miyazawa was cited to teach that hydroformylation reactions using rhodium catalysts or recycled rhodium catalysts can be conducted under pressures above the 138 bar taught by Yates. Therefore, the examiner contends that the combination of reference teachings is proper, and as such, the rejections are being maintained.

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sikarl A. Witherspoon whose telephone number is 571-272-0649. The examiner can normally be reached on M-F 8:30-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thurman Page can be reached on 571-272-0602. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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